National Institute of Environmental Health Sciences

Epidemiology of West Nile infection in Volgograd, Russia, in relation to climate change and mosquito (Diptera: Culicidae) bionomics

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Abstract:

In 1999, there was the large outbreak of West Nile fever (WNF) in Southern Russia (>500 cases in the Volgograd Province). In 2000-2004, the WNF incidence rate decreased steadily to zero, but a new outbreak occurred in 2007 (64 cases). The analysis of historical climate data for Volgograd from 1900 to present showed that the years 1999 and 2007 were the hottest ones due to a very mild "winter" (Dec.-Mar.) and a hot "summer" (June-Sep.). There are up to 15 potential WNF vectors in Volgograd, but only Culex pipiens and Culex modestus are abundant in late summer, both in urban and rural settings. Only these species are naturally attracted to and feed on both humans and birds. The RNA of pathogenic WN virus genovariant was found by reverse transcriptase polymerase chain reaction only in Culex mosquitoes at the infection rate of about 0.04%. So these species may be considered as potential WNF "bridge vectors" between birds and humans as well as main vectors in sylvatic avain cycle. Their abundance in an epidemic season was higher in the years with a mild winter and a hot summer, so this phenomenon may serve as a connecting link between a climate and WNF epidemiology. These findings give some hints on the predisposing factors for WNF epidemic as well as the possibility to predict WNF outbreaks in the temperate climate zones.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Meteorological Factors, Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Russia

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: West Nile Virus

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content